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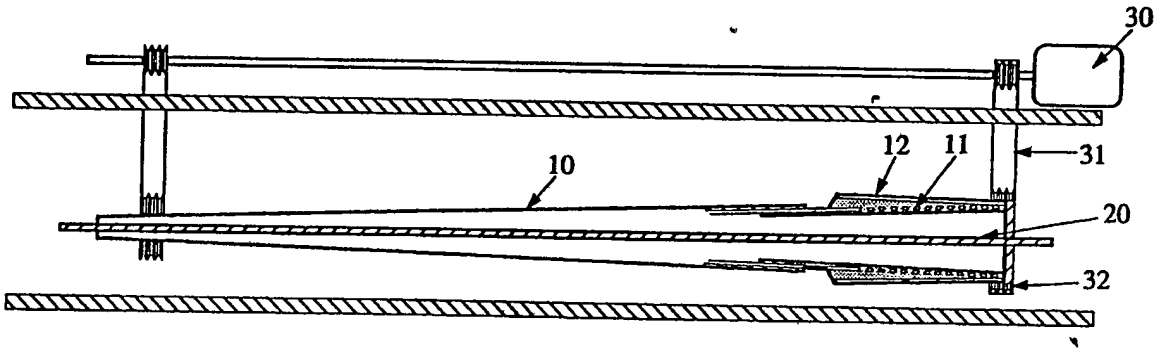
(54) Title: CORROSION RESISTANT COATED STEEL POLE



(57) Abstract

The invention provides a corrosion resistant coating for a steel pole (10) destined to be embedded in the ground and is particularly suitable in highly corrosive soil regions, e.g. arid regions and includes a method of applying a cement mortar layer (11) to the inner and outer shell of a pole base at least in the area to be embedded in the ground, the mould casing (12) around the embedded portion of the pole being of vitrified clay or like material to contain the outer casing of cement to resist corrosive attack and increase the strength of the pole.

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CORROSION RESISTANT COATED STEEL POLE

The invention relates to a method of producing steel poles for use for example as a power pole and particularly relates to the method of producing a pole butt which is resistant to corrosion when the pole is embedded in the ground.

Problems exist with all kinds of poles particularly steel poles in producing a ground corrosion resistant butt portion particularly those used in highly corrosive soil areas such as in arid regions of Australia and elsewhere.

In the past most types of planted poles have suffered from corrosion and/or termite attack in the region just below and just above ground level. In particular, steel pipes even those protected with special paint or galvanising have corroded in adverse highly corrosive soil conditions.

Additionally, steel poles have been constructed from heavy gauge steel in order to resist locally buckling near ground level when the pole is subjected to service loads. This invention enables use of a thinner steel shell than has hitherto been possible without loss of strength, whilst being extremely resistant to corrosive effects.

There is provided according to the present invention a process of treating a tubular pole member destined to be planted in the ground comprising the steps of applying a cement or like mortar or grout to the inner and outer surfaces of at least that part of the tubular member to be embedded in the ground.

Conveniently the grout/mortar is applied in a spinning operation. Preferably the tubular member includes a series of through apertures allowing coating of both surfaces of the member with the apertures transporting the grout/mortar from one surface to the other surface of the pole structure.

In a further aspect the embedded portion of the pole member is supported in a casing which at least initially forms a mould during application of mortar/grout to the surfaces of the pole, and may also provide an outer shield against strong corrosive or termite attack.

In a further aspect of the invention there is provided a process of producing a steel power pole including steps of applying a dense cement mortar layer to the inside surface of a power pole shell and applying a layer of dense cement mortar to the outer surface of the pole shell at least in the area to be embedded in the ground; optionally, the pole shell is formed with an outer casing of dense cement on and adjacent to the embedded section of the steel pole, the mould casing around the embedded portion of the steel pole being of vitrified clay or the like material, to contain the outer casing of cement which will resist corrosive attack attack and increase the structural strength of said pole.

The invention will be described in greater detail with reference to the accompanying drawings in which Figure 1 shows a steel pole with a butt made according to the present invention embedded in the ground,

Figure 2 shows schematically a spinning apparatus for applying cement mortar/grout to the pole interior and exterior portions,

Figure 3 shows a typical mould construction used during said spinning operation.

Referring to the figures the tubular steel pole 10 is of tapered construction and includes a series of apertures 11 therein. The pole butt is positioned to concentrically within an outer casing 12. The casing may be of vitrified earthenware material, strong plastic such as ABS, galvanised steel or non-corrosive metal alloy, or cardboard or the like material as will be described in greater detail later.

The dense cement mortar layer is applied during spinning of the pole and butt casing being pumped through pipe 20. The cement mortar is transported through holes 11 to coat both pipe surfaces in the butt region and fill the mould formed by the casing 12 and closure pieces 14, 15 shown in figure 3.

Referring to figure 2 the pole and casing arrangement is mounted before spinning on a spinning apparatus which is known per se having a motor 30 driving drive belts 31 through pulleys 32 to spin the pipe about its longitudinal axis whilst cement mortar is pumped through pipe 20.

Referring to figure 3 the outer casing and butt portion of the steel pole is closed in to form a mould construction using end caps 14 and 15 clamped to the outer casing.

The method of manufacture of the improved pole is simple and represents an advancement over the previously used technique of applying cement mortar to the inside steel pipes by spinning. In the case of the present invention the outer casing is positioned accurately during spinning by the clamp pieces 14 and 15 so that cement mortar is confined within the annular space on both sides of the steel pipe and within the confines of the outer casing represented generally as 17.

The outer casing 12 should be made of strong anti-corrosive material such as vitrified clay where the pole is destined embedded in aggressive ground conditions such as in some arid areas in Australia or in termite infested area if the pole is timber. Alternatively a non-load supporting material such as a cardboard casing may be used to serve simply as an outer mould during the spinning operation leaving the outer surface of the cement mortar as the corrosion resistant material.

The use of a dense cement mortar lining in the pole serves to stiffen the pole structure thereby eliminating or at least substantially reducing the chance of buckling in the pole under load and also to significantly increase the strength of the pole by forming a composite section with the steel shell. It is contemplated that the cost of providing a

composite pole of the present construction will be more than off-set by the reduced cost of being able to use a thinner gauge shell and by the savings in surface protection of the embedded section of the pole. The tapered pole construction is usually made up of several modules of pipe which are telescoped together and in a preferred form of the invention the pole portions destined to be used above ground are also coated on the inside surface with the cement grout to provide added strength of the buckling of the pole and protection against corrosion that may result from build up of condensation and other moisture that may occur over time on the internal surface of the pole.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A process of treating a tubular pole member destined to be planted in the ground for use in forming a power pole or the like comprising the steps of applying a cement or like mortar or grout on the inner and outer surfaces of at least that part of the tubular member to be embedded in the ground.

2. A process as claimed in claim 1 wherein the mortar/grout material is applied in a spinning operation internally of the tubular member, the member including a series of apertures allowing egress of mortar/grout material from the inner surface to the outer surface of the tubular member such that the internal and at least part of the outer surface of the pole is coated with said mortar/grout material on at least that part of the tubular member to be embedded in the ground.

3. Process of treating a hollowed tubular pole member in which at least portion of the pole is destined to be embedded in the ground, surrounding the said portion of the pole by an outer mould casing, mounting the pole and mould casing in a spinning apparatus for spinning the pole and the associated mould casing, applying cement or like mortar/grout material in liquid form into the interior of the spinning pole and mould to apply material to the inner and outer surfaces of the pole member to constitute said treatment, the mould being filled with said material during said treatment and the material being allowed to cure.

4. A process as claimed in claim 3 wherein at least that part of the pole surrounded by said outer mould is apertured to facilitate flow of mortar/grout material from the interior of the pole into the cavity formed by the outer mould.

5. A process as claimed in claim 3 or 4 wherein the outer mould member is retained as part of the pole structure to be embedded in the ground.

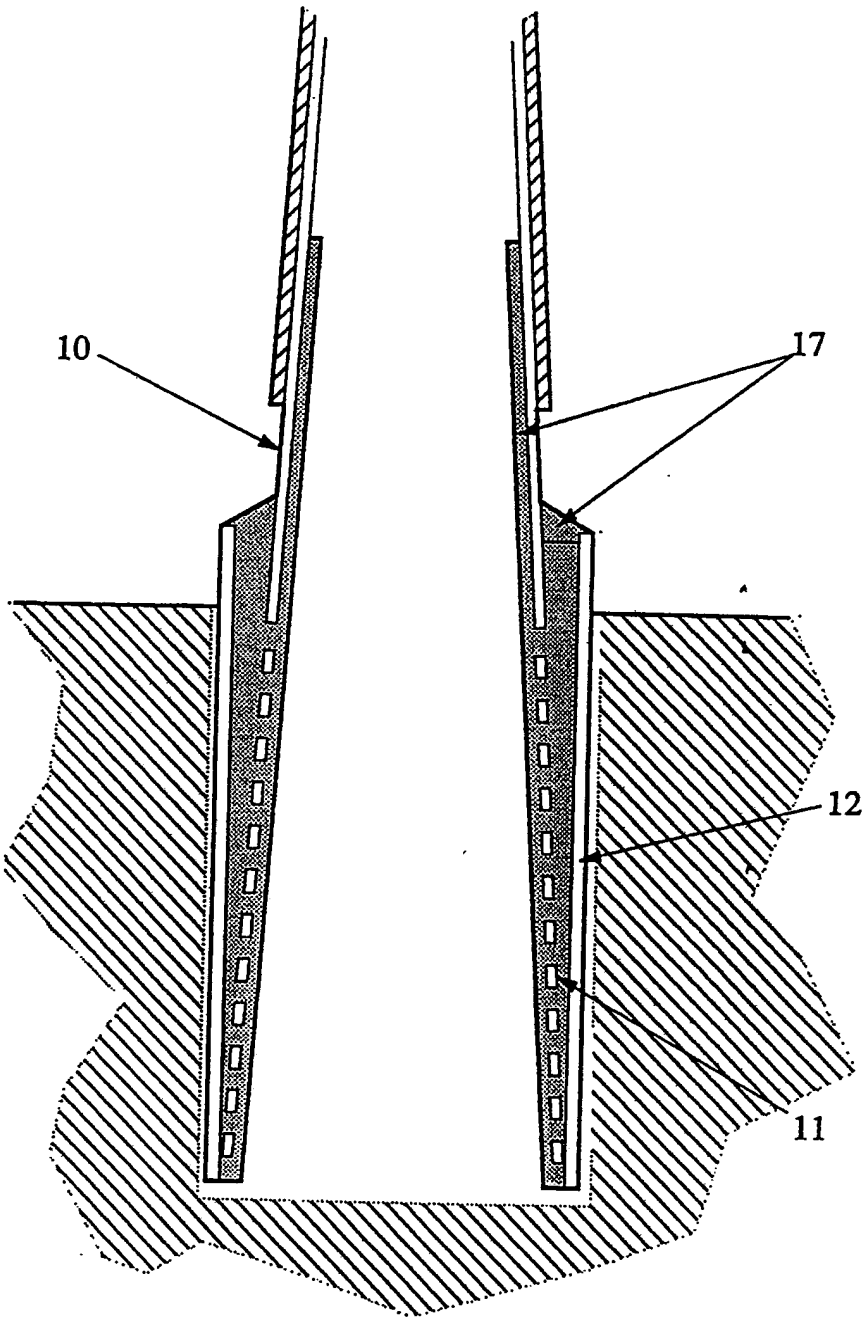
6. A process of producing a treated steel power pole including the steps of applying a dense cement mortar layer to the inside surface of a power pole shell and applying a cement mortar layer to the outer surface of the pole shell at least in an area destined to be embedded in the ground, wherein the pole portion to be embedded is enclosed in a mould to hold and form an outer casing of concrete adjacent to the embedded section of the steel pole, the mould casing being of vitrified clay or like material to resist the corrosive attack and to increase the structure strength of the pole.

7. A pole when made according to the process in any one of claims 1 to 6.

8. A process for producing a treated pole substantially as hereinbefore described with reference to the drawings.

9. A pole when made according to the process of claim 8 when having reference to Figure 1 of the drawings.

Fig 1.



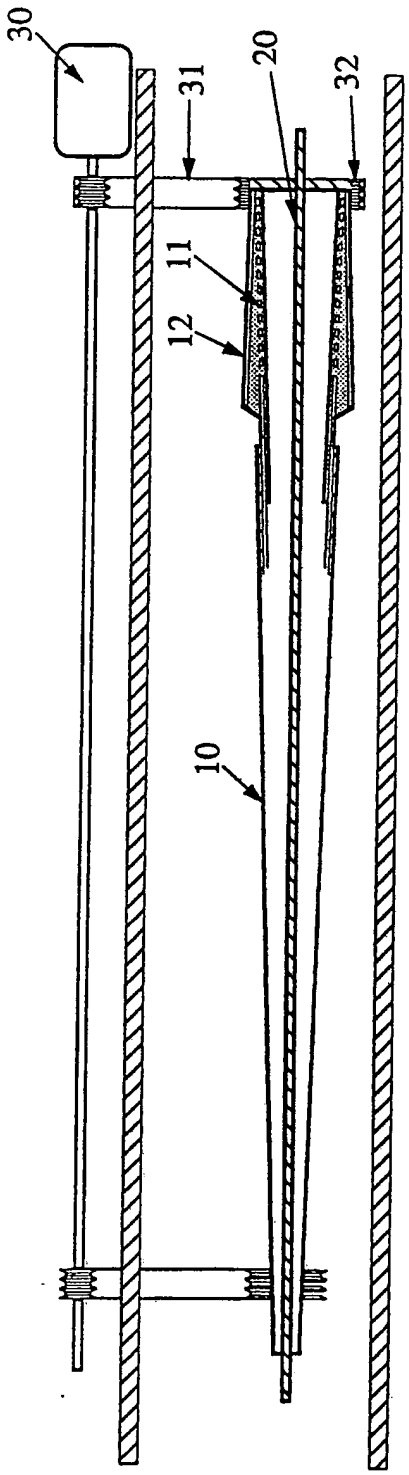


Fig 2.

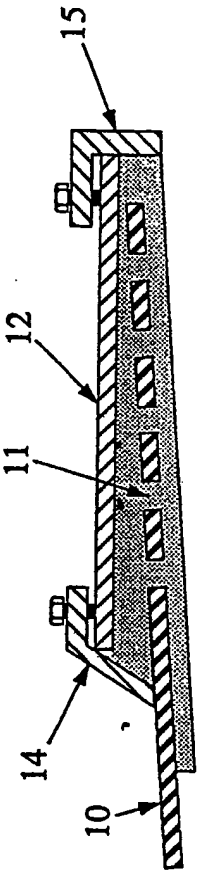


Fig 3.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU92/00395

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.[5] E04H 12/02, 12/08, 12/22, 12/32, B28B 21/58, 23/20, F16L 58/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: E04H 12/02, 12/08, 12/22, 12/32, B28B 21/58, 23/20, F16L 58/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	AU,A, 1631/26 (WATSON) 14 June 1927 (14.06.27) column 2, lines 10-24 and figure 2	1-4,7-9
X	AU,A, 19175/34 (P FISTERSHAMMER) 28 March 1935 (28.03.35) column 4, lines 12-17 and figure 2	1,7
X	AU,A, 24191/35 (HARDIE AND CO. LTD. NSW) 3 September 1936 (03.09.36) column 3, lines 25-33	1,7
X	AU,B, 3452/40 (113891) (DI-MET PTY. LTD.) 2 October 1941 (02.10.41) column 1, lines 9-16; column 6, lines 35-57	1,7

[X] Further documents are listed in the continuation of Box C.

[ ] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 October 1992 (21.10.92)	27 Oct 1992 (27.10.92)
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X	AU,B, 8981/61 (256517) (THE HUME PIPE COMPANY (SOUTH AFRICA) LTD.) 2 May 1963 (02.05.63) page 3, lines 11-16; page 6, lines 13-30; figures 1-3	1-4,7-9
X	AU,B, 45637/72 (AMERON, INC.) 21 February 1974 (21.02.74) page 7, lines 5-19, figures 1-3	1,7